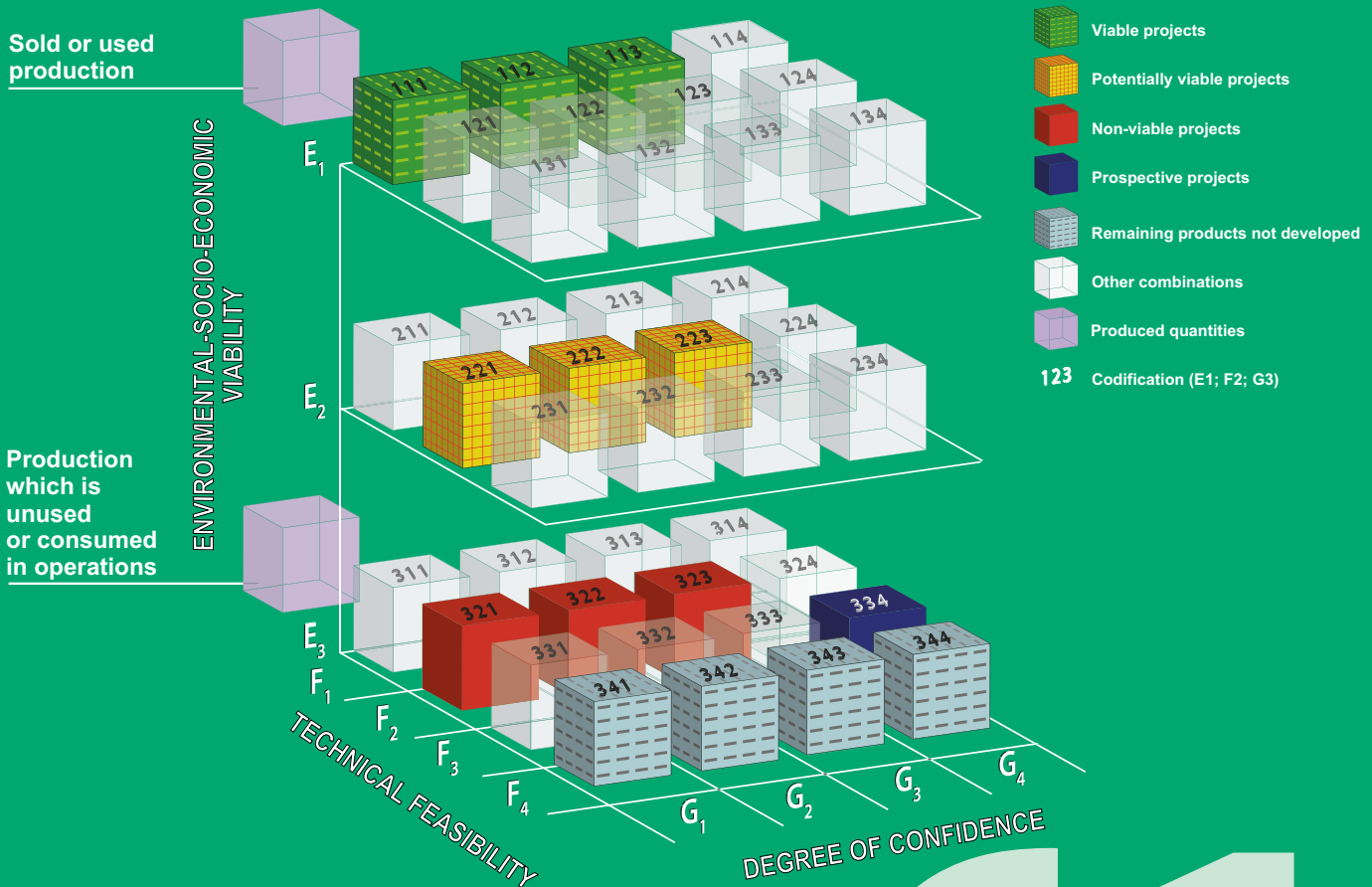


# United Nations Framework Classification for Resources

Update 2019



# 61

UNECE Energy Series



**UNECE**

# **United Nations Framework Classification for Resources**

**Update 2019**

**ECE ENERGY SERIES No. 61**



**UNITED NATIONS**

Geneva, 2020

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This Update 2019 of the United Nations Framework Classification for Resources (UNFC) is an update of the United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 incorporating Specifications for its Application (ECE Energy Series 42 and ECE/ENERGY/94) that was issued at the end of 2013.

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## ACRONYMS AND ABBREVIATIONS

<b>AAPG</b>	American Association of Petroleum Geologists
<b>CRIRSCO</b>	Committee for Mineral Reserves International Reporting Standards
<b>EAGE</b>	European Association of Geoscientists and Engineers
<b>ECE</b>	United Nations Economic Commission for Europe
<b>Expert Group</b>	ECE Expert Group on Resource Management (formerly the ECE Expert Group on Resource Classification)
<b>IAEA</b>	International Atomic Energy Agency
<b>NEA</b>	Nuclear Energy Agency of OECD
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PRMS</b>	Petroleum Resources Management System of 2018 which has been endorsed by SPE, WPC, AAPG, SPEE, SEG, EAGE and SPWLA
<b>SDGs</b>	Sustainable Development Goals
<b>SEG</b>	Society of Exploration Geophysicists
<b>SPE</b>	Society of Petroleum Engineers
<b>SPEE</b>	Society of Petroleum Evaluation Engineers
<b>SPWLA</b>	Society of Petrophysicists and Well Log Analysts
<b>UNFC</b>	United Nations Framework Classification for Resources
<b>WPC</b>	World Petroleum Council

# **PART I**

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

## INTRODUCTION

This Update 2019 of the United Nations Framework Classification for Resources (UNFC) is an update of the United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 *incorporating Specifications for its Application* (ECE Energy Series 42 and ECE/ENERGY/94) that was issued at the end of 2013.

In September 2017, the ECE Committee on Sustainable Energy at its twenty-sixth session approved the change of name of the United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 to the **United Nations Framework Classification for Resources (UNFC)**.

The Expert Group on Resource Management at its tenth session (Geneva, Switzerland, 29 April – 3 May 2019; report of session: ECE/ENERGY/GE.3/2019/2) recommended that the language in UNFC be revisited to be inclusive of the full spectrum of the various commodities and stakeholders of UNFC.

This updated version of UNFC is intended to satisfy the requirements of different resource sectors and applications, as well as making it fully aligned to the sustainable resource management called for by the 2030 Agenda for Sustainable Development. The key changes, including the normalization of the text, make UNFC applicable for all resources. This update does not change the classification system and hence does not impact the current users of UNFC. The updated text is intended to make application easier for users of UNFC.

## I. APPLICATION

The United Nations Framework Classification for Resources (UNFC) is a resource<sup>1</sup> project-based and principles-based classification system for defining the environmental-socio-economic viability and technical feasibility of projects to develop resources.<sup>1</sup> UNFC provides a consistent framework to describe the level of confidence of the future quantities produced by the project.

Sources, such as solar, wind, geothermal, hydro-marine, bioenergy, injection for storage, hydrocarbons, minerals, nuclear fuels and water, are the feedstock to resource projects from which products can be developed. The sources may be in their natural or secondary (anthropogenic sources, tailings, etc.) state.

Products of the project may be bought, sold or used, including electricity, heat, hydrocarbons, hydrogen, minerals, and water. It is noted that with some projects, such as for renewable energy, the products (electricity, heat, hydrogen etc.) are different from the sources (wind, solar irradiation etc.). In other projects the products and sources may be similar e.g. in petroleum projects both the sources and products are oil and/or gas, although the fluid state and properties may change from reservoir to surface conditions.

A Project is a defined development or operation which provides the basis for environmental, social, economic and technical evaluation and decision-making. The project plan may be detailed or conceptual (in the case of long-term national resource planning). The project plan should be sufficiently detailed to allow an appropriate assessment for the stakeholder needs at the defined level of maturity.

UNFC has been designed to meet, to the extent possible, the needs of applications pertaining to:

- policy formulation based on resource studies;
- resources management functions;
- corporate business processes; and
- financial capital allocation.

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<sup>1</sup> The terms “resource” and “resources” are not defined in UNFC, because they have specific, but different, definitions in different sectors. The terms are used here purely in a generic sense.



## II. CATEGORIES AND SUB-CATEGORIES

UNFC is a principles-based system in which the products of a resource project are classified on the basis of the three fundamental criteria of environmental-socio-economic viability (E), technical feasibility (F), and degree of confidence in the estimate (G), using a numerical coding system. Combinations of these criteria create a three-dimensional system (Figure 1). Categories (e.g. E1, E2, E3) and, in some cases, sub-categories (e.g. E1.1) are defined for each of the three criteria as set out and defined in Annexes I and II.

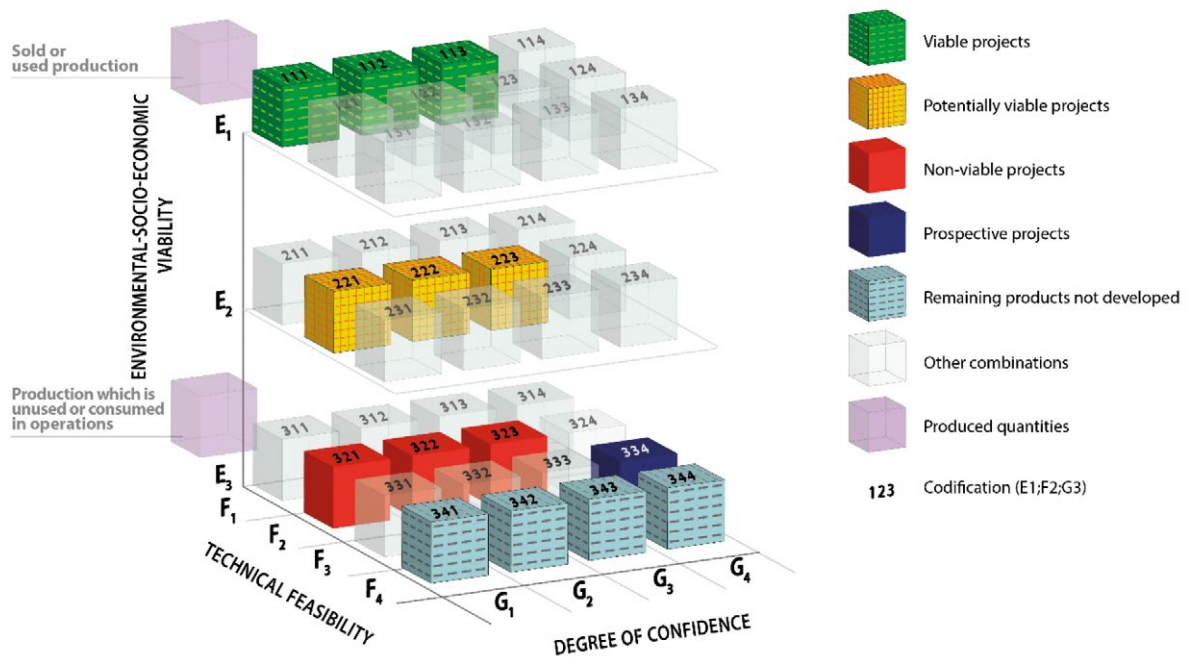
The first set of Categories (the E axis) designates the degree of favourability of environmental-socio-economic conditions in establishing the viability of the project, including consideration of market prices and relevant legal, regulatory, social, environmental and contractual conditions. The second set (the F axis) designates the 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, and reflect standard value chain management principles. The third set of categories (the G axis) designates the degree of confidence in the estimate of the quantities of products from the project.

The Categories and Sub-categories are the building blocks of the system, and are combined in the form of "Classes". UNFC can be visualized in three dimensions, as shown in Figure 1, or represented in a practical two-dimensional abbreviated version as shown in Figure 2.

## III. CLASSES

A Class is uniquely defined by selecting from each of the three criteria a particular combination of a Category or a Sub-category (or groups of Categories/Sub-categories). Since the codes are always quoted in the same sequence (i.e. E; F; G), the letters may be dropped and just the numbers retained. The numerical code defining a Class is then identical in all languages using Hindu-Arabic numerals.

**FIGURE 1**  
UNFC Categories and Examples of Classes



While there are no explicit restrictions on the possible combinations of E, F and G Categories or Sub-categories, some may be more useful than others. For the more important combinations (Classes and Sub-classes), specific labels are provided as a support to the numerical code, as illustrated in Figure 2.

As shown in Figure 2, the total product available for development, or on production, is classified at a given date. Quantification of the product may require consideration of the project lifetime/limit (such as for renewable energy projects). Classification is done in terms of the following:

- (a) Produced quantities that have been sold or used. This would include direct domestic use of a solar home installation, or non-sales domestic supply of a product to a local market.
- (b) Produced quantities which are unused or have been consumed in operations.
- (c) Quantities of a known product that may be produced in the future. Technical and environmental-socio-economic evaluation studies based on projects constitute the basis for the classification.
- (d) Remaining quantities of product not developed by any project.
- (e) Quantities of a product that may be produced in the future from prospective projects. Technical and environmental-socio-economic evaluation studies based on prospective projects constitute the basis for the classification.
- (f) Remaining quantities of product not developed by any prospective project.

**FIGURE 2**  
Abbreviated Version of UNFC, showing Primary Classes

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

- a. Future production that is either unused or consumed in the project operations is categorized as E3.1. These can exist for all classes of recoverable quantities.
- b. G categories may be used discretely, or in cumulative scenario form (e.g. G1+G2).
- c. Estimates associated with Viable Projects are defined in many classification systems as Reserves, but there are some material differences between the specific definitions that are applied within different industries and hence the term is not used here.
- d. Not all Potentially Viable Projects will be developed.
- e. Potentially Viable Projects may satisfy the requirements for E1.
- f. Non-Viable Projects include those that are at an early stage of evaluation in addition to those that are considered unlikely to become viable developments within the foreseeable future.
- g. Remaining products not developed from identified projects or prospective projects may become developable in the future as technological or environmental-socio-economic conditions change. Some or all of these estimates may never be developed due to physical and/or environmental-socio-economic constraints. This classification may be of less value to renewable resource projects but can still be used to indicate the amount of unrealized potential. It is emphasised that the remaining products are quantities which, if produced, could be bought, sold or used (i.e. electricity, heat, etc., not wind, solar irradiation, etc.).

The description of the total product can be maintained by full application of the classification for all projects at the source. For this purpose, a reference point shall be established where the quantity, quality and sales (or transfer<sup>2</sup>) price of product are determined.

Except for past production that may have been measured, quantities are always estimated. There will be a degree of uncertainty associated with the estimates. The uncertainty is communicated either by quoting discrete quantities of decreasing levels of confidence (high, moderate, low) or by generating three specific scenarios or outcomes (low, best and high estimates). A low estimate scenario is directly equivalent to a high confidence estimate (i.e. G1), whereas a best estimate scenario is equivalent to the combination of the high confidence and moderate confidence estimates (G1+G2). A high estimate scenario is equivalent to the combination of high, moderate and low confidence estimates (G1+G2+G3). Quantities may be estimated using deterministic or probabilistic methods.

Projects that do not meet the requirements of a Viable Project are contingent on one or more conditions yet to be fulfilled. These contingent projects are subdivided: projects for which the environmental-socio-economic conditions are expected to be acceptable for implementation and those where they are not.

## IV. SUB-CLASSES

For further clarity in global communications, additional UNFC Sub-classes are defined based on the full granularity provided by the Sub-categories included in Annex II. These are illustrated in Figure 3.

## V. HARMONIZATION OF RESOURCE INVENTORIES

Classifications other than the one shown in Figure 2 can be generated by choosing appropriate combinations of Categories, or by grouping or further subdividing the Categories. This permits the harmonization of inventories that are developed on the basis of different classification systems.

Conversely, when the unabbreviated UNFC is used to build an inventory, this can be converted to inventories developed from other harmonized classifications without going back to the basic information.

## VI. ADAPTING TO NATIONAL OR LOCAL NEEDS

Classifications often need to be adapted to national or local needs. Modifications of this nature should be checked for consistency with the unabbreviated UNFC and other applications in use. For transparency, variances from UNFC should be documented when adapting.

## VII. ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

Environmental and social issues, including those specified in the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs), that may affect the development of a project are included in the classification of a project under UNFC. In classifying a project, the E-axis Categories are explicitly defined to include both environmental and social issues that may be relevant to the viability of the project, in addition to economic, legal and other non-technical factors.

The identification and consideration at the time of the estimate of all known social or environmental aspects which may impact the project during its life cycle is recognized as an integral part of the assessment. The

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2 In large integrated projects, it may be necessary to determine an internal “transfer” price between “upstream” operations and “midstream” or “downstream” operations based on a netback calculation.

presence of social or environmental factors can prevent a project from proceeding or it can lead to the suspension or termination of activities in a producing project. In some cases, the presence of positive environmental or social externalities can be a key driver for starting a project. The classification will record the maturity of environmental and social aspects and their impact on the project development.

**FIGURE 3**  
UNFC Classes and Sub-classes defined by Sub-categories<sup>a</sup>

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 <sup>b</sup>	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

a. Refer also to the notes for Figure 2.

b. Development Pending Projects may satisfy the requirements for E1.

# ANNEX I<sup>a</sup>

## DEFINITION OF CATEGORIES AND SUPPORTING EXPLANATIONS

### E Axis – Environmental-Socio-Economic Viability

Category	Definition	Supporting Explanation
<b>E1</b>	Development and operation are confirmed to be environmentally-socially-economically viable.	Development and operation are environmentally-socially-economically viable on the basis of current conditions and realistic assumptions of future conditions. All necessary conditions have been met (including relevant permitting and contracts) or there are reasonable expectations that all necessary conditions will be met within a reasonable timeframe and there are no impediments to the delivery of the product to the user or market. Environmental-socio-economic viability is not affected by short-term adverse conditions provided that longer-term forecasts remain positive.
<b>E2</b>	Development and operation are expected to become environmentally-socially-economically viable in the foreseeable future.	Development and operation are not yet confirmed to be environmentally-socially-economically viable but, on the basis of realistic assumptions of future conditions, there are reasonable prospects for environmental-socio-economic viability in the foreseeable future.
<b>E3</b>	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.	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; or, environmental-socio-economic viability cannot yet be determined due to insufficient information.  Also included are estimates associated with projects that are forecast to be developed, but which will be unused or consumed in operations.

### F Axis – Technical Feasibility and Maturity

Category	Definition	Supporting Explanation
<b>F1</b>	Technical feasibility of a development project has been confirmed.	Development or operation is currently taking place or, sufficiently detailed studies have been completed to demonstrate the technical feasibility of development and operation. A commitment to develop should have been or will be forthcoming from all parties associated with the project, including governments.
<b>F2</b>	Technical feasibility of a development project is subject to further evaluation.	Preliminary studies of a defined project provide sufficient evidence of the potential for development and that further study is warranted. Further data acquisition and/or studies may be required to confirm the feasibility of development.
<b>F3</b>	Technical feasibility of a development project cannot be evaluated due to limited data.	Very preliminary studies of a project, indicate the need for further data acquisition or study in order to evaluate the potential feasibility of development.
<b>F4</b>	No development project has been identified.	Remaining quantities of product not developed by any project. These are quantities which, if produced, could be bought, sold or used (i.e. electricity, heat, etc., not wind, solar irradiation, etc.).

<sup>a</sup> Annex I forms an integral part of UNFC.

**G Axis – Degree of Confidence**

Category	Definition	Supporting Explanation
<b>G1</b>	Product quantity associated with a project that can be estimated with a high level of confidence.	Product quantity estimates may be categorized discretely as G1, G2 and/or G3 (along with the appropriate E and F Categories), based on the degree of confidence in the estimates (high, moderate and low confidence, respectively) based on direct evidence.
<b>G2</b>	Product quantity associated with a project that can be estimated with a moderate level of confidence.	Alternatively, product quantity estimates may be categorized as a range of uncertainty as reflected by either (i) three specific deterministic scenarios (low, best and high cases) or (ii) a probabilistic analysis from which three outcomes (P90, P50 and P10) <sup>3</sup> are selected. In both methodologies (the “scenario” and “probabilistic” approaches), the estimates are then classified on the G Axis as G1, G1+G2 and G1+G2+G3 respectively.
<b>G3</b>	Product quantity associated with a project that can be estimated with a low level of confidence.	<p>In all cases, the product quantity estimates are those associated with a project.</p> <p>Additional Comments: The G axis Categories are intended to reflect all significant uncertainties (e.g. source uncertainty, geologic uncertainty, facility efficiency uncertainty, etc.) impacting the estimate forecast for the project. Uncertainties include variability, intermittency and the efficiency of the development and operation (where relevant). Typically, the various uncertainties will combine to provide a full range of outcomes. In such cases, categorization should reflect three scenarios or outcomes that are equivalent to G1, G1+G2 and G1+G2+G3.</p>
<b>G4</b>	Product quantity associated with a Prospective Project, estimated primarily on indirect evidence.	<p>A Prospective Project is one where the existence of a developable product is based primarily on indirect evidence and has not yet been confirmed. Further data acquisition and evaluation would be required for confirmation.</p> <p>Where a single estimate is provided, it should be the expected outcome but, where possible, a full range of uncertainty should be calculated for the prospective project.</p> <p>In addition, it is recommended that the chance of success (probability) that the prospective project will progress to a Viable Project is assessed and documented.</p>

3 Where P90 means that there is a 90 per cent probability that the actual outcome will equal or exceed this estimate. Similarly, P50 and P10 reflect 50 per cent and 10 per cent probability respectively that the actual outcome will equal or exceed the estimate.

# ANNEX II<sup>a</sup>

## DEFINITION OF SUB-CATEGORIES

Category	Sub-Category	Sub-Category Definition
<b>E1</b>	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.
<b>E2</b>	No Sub-categories defined	
<b>E3</b>	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.

Category	Sub-Category	Sub-Category Definition
<b>F1</b>	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
<b>F2</b>	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.

<sup>a</sup> Annex II forms an integral part of UNFC.

Category	Sub-Category	Sub-Category Definition
<b>F3</b>	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.
<b>F4</b>	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.

#### G – Degree of Confidence

Category	Sub-Category	Sub-Category Definition
<b>G4</b>	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.



# **PART II\***

## **Specifications for the Application of the United Nations Framework Classification for Resources (UNFC)**

\* Unless otherwise indicated, all the Sections and Annexes listed and referenced in Part II relate to Part II only.

## I. INTRODUCTION

The United Nations Framework Classification for Resources (UNFC) is a universally acceptable and internationally applicable resource<sup>1</sup> project-based and principles-based classification system for defining the environmental-socio-economic viability and technical feasibility and maturity of projects to develop resources.<sup>1</sup> UNFC provides a consistent framework to describe the level of confidence of the future quantities produced by the project.

Sources, such as solar, wind, geothermal, hydro-marine, bioenergy, injection for storage, hydrocarbons, minerals, nuclear fuels and water, are the feedstock to resource projects from which products can be developed. The sources may be in their natural or secondary (anthropogenic sources, tailings, etc.) state.

This Update 2019 of UNFC is an update of the United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 incorporating Specifications for its Application (ECE Energy Series 42 and ECE/ENERGY/94) that was issued at the end of 2013. The name of the United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 (UNFC-2009) was changed to the United Nations Framework Classification for Resources in 2017. The text of UNFC-2009 (as contained in Parts I and III of that publication (ECE Energy Series 42)) was previously published in 2010 (ECE Energy Series 39 and ECE/ENERGY/85).

The importance of environmental and social issues in the context of resource classification is appropriately recognized throughout this updated version of UNFC.

At the first session of the Expert Group on Resource Management (formerly known as the Expert Group on Resource Classification until end-2018) in April 2010, it was agreed that generic specifications would be developed for UNFC, but only to the extent considered necessary to achieve an appropriate level of consistency in the reporting of estimated quantities under UNFC. UNFC is aligned with some other classification systems via a Bridging Document. A Bridging Document explains the relationship between UNFC and another classification system, including instructions on how to classify estimates generated by application of that system using the UNFC Numerical Codes.

Effective December 2019, the following Bridging Documents have been published:

- (a) Bridging Document between the Committee for Mineral Reserves International Reporting Standards (CRIRSCO) Template and UNFC.
- (b) Bridging Document between the SPE Petroleum Resources Management System (PRMS) and UNFC.
- (c) Bridging Document between the Organisation of Economic Co-operation and Development Nuclear Energy Agency (NEA)/International Atomic Energy Agency (IAEA) Uranium Classification and UNFC.
- (d) Bridging Document between the Oil and Fuel Gas Reserves and Resources Classification of the Russian Federation of 2013 and UNFC.
- (e) Bridging Document between the National Standard of the People's Republic of China "Classification for Resources/Reserves of Solid Fuels and Mineral Commodities (GB/T 17766-1999)" and UNFC.
- (f) Bridging Document between the National Standard of the People's Republic of China "Classification for Petroleum Resources/Reserves (GB/T 19492-2004)" and UNFC.

The most recent version of all Bridging Documents is posted to the UNFC website at: <https://www.unece.org/energy/se/reserves.html>.

It is recognized that there may be differences between reporting at a corporate level and reporting by government entities at a national level, where estimates have been aggregated and/or derived using different information and procedures. This issue is discussed further in Section II "National Resource Reporting".

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<sup>1</sup> The terms "resource" and "resources" are not defined in UNFC, because they have specific, but different, definitions in different sectors. The terms are used here purely in a generic sense..

In Section III, the issue of disclosure is addressed, noting that UNFC is a voluntary system that does not mandate specific Categories of projects (Classes or Sub-classes) to be disclosed. Generic specifications are provided in Section IV. These are considered necessary to ensure that product quantities (for any product) that are reported as UNFC compliant are sufficiently comparable to provide meaningful information to users of such data. The terms “reserves” and “resources” are not defined in UNFC, because they both have specific, but different, definitions across different sectors.

Governance of UNFC and its specifications is the responsibility of the ECE Expert Group on Resource Management.

A Glossary of Terms is included in Annex I, but is limited to those terms that are specific to UNFC for which definitions are not already adequately provided in Aligned Systems. In addition, guidelines on the application of key instructions in UNFC are provided in Annex II. Guidelines on the use of project maturity to sub-classify projects using UNFC are included in Annex III.

## II. NATIONAL RESOURCE REPORTING

At a government level, national product estimates may be based on an aggregation of reported or published corporate estimates for individual projects.<sup>2</sup> However, such estimates may not cover all known or potential development options. Further, where government organizations have a responsibility for developing estimates at a regional or national level, the estimates may be different from corporate estimates on an individual project basis, regardless of the classification system being used. In such cases, regional or national estimates using UNFC shall be derived using an appropriate methodology based on the nature and extent of available data. In accordance with Generic Specification J, the aggregation methodology shall be disclosed.

When reporting aggregated estimates using UNFC, it is mandatory that the relevant Numerical Codes for the individual Classes are disclosed. For example, it may be useful at a national level to determine the sum of estimated quantities for Viable Projects and Potentially Viable Projects at a “best estimate” level, though it is preferred that the breakdown by Class is also provided.

## III. DISCLOSURE

UNFC is a voluntary system and does not impose any rules regarding which Categories of projects (Classes or Sub-classes) that should be disclosed. Unless mandated or restricted by a government or other regulatory body, the disclosure of product quantities under UNFC is entirely at the discretion of the reporter. However, in order to ensure that those quantities that are disclosed will provide meaningful information to users of product information, certain generic specifications are included below for the purpose of ensuring clarity and comparability. In some cases, these specifications can be appropriately addressed through the use of footnotes to the report.

## IV. GENERIC SPECIFICATIONS

In these generic specifications, the following words have specific meanings:

- “Shall” is used where a provision is mandatory;
- “Should” is used where a provision is preferred; and,
- “May” is used where alternatives are equally acceptable.

Where a generic specification is defined below, this sets a minimum standard for reporting under UNFC.

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<sup>2</sup> Note that regulatory bodies may explicitly preclude such aggregation in corporate reporting under any circumstances.

## A. Use of numerical codes

While the defined Classes and Sub-classes shown in Figures 2 and 3 (see Part I) may be used as supplementary terminology, the relevant Numerical Code(s) shall always be reported in conjunction with the estimated quantity. For example, these may be documented in the form 111, 111+112, or 1.1;1.2;1, as appropriate.

Note that some Sub-categories are defined in the text that follows that are in addition to those provided in Annex II of UNFC. These optional Sub-categories have been identified as potentially useful in certain situations and have been defined herein in order to ensure consistency in their application. Nothing in this document shall preclude the possible use of additional Sub-classes in the future that may be deemed to be useful in particular cases, especially where such Sub-classes facilitate the linkage to other systems and which may be defined in Bridging Documents.

## B. Bridging document

UNFC may be aligned with some other classification systems. A Bridging Document explains the relationship between UNFC and another classification system, including instructions on how to classify estimates generated by application of that system using the UNFC Numerical Codes. The Bridging Document that was used as the basis for the evaluation shall be disclosed in conjunction with the reported quantities.

## C. Effective date

Reported estimates of product quantities are as at the Effective Date of the evaluation. The Effective Date shall be clearly stated in conjunction with the estimate. The evaluation should take into account all data and information available to the evaluator prior to the Effective Date. If information becomes available subsequent to the Effective Date, but prior to reporting, that could have significantly changed the estimate as at the Effective Date, the likely effect of this information shall be included in the report.

## D. Product

Estimates should be classified separately for each product that will be sold, transferred, used, unused or consumed in operations. Where estimates for different products have been aggregated for classification, and separate estimates are not provided, the aggregated estimates shall be accompanied by a statement clarifying which products have been aggregated and the conversion factor(s) used to render them equivalent for the purposes of aggregation.<sup>3</sup>

## E. Basis for estimate

Estimates may be attributable to the project as a whole, or may reflect the proportion of those estimates that is attributable to the reporting entity's environmental-socio-economic interest in the project.<sup>4</sup> The reporting basis shall be clearly stated in conjunction with the estimate. Government royalty obligations are often treated as a tax to be paid in cash and are therefore generally classified as a cost of operations. In such cases, the reported estimate may include the proportion attributable to the royalty obligation. Where the reported estimate excludes the proportion attributable to the royalty obligation, this shall be disclosed.

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3 For example, crude oil volumes may be reported inclusive of condensate and natural gas liquids, in which case this fact shall be disclosed. Further, if gas volumes are converted to "oil equivalent" volumes and aggregated with crude oil estimates, this shall be disclosed. In addition, where product estimates (e.g. electricity from solar or wind, oil, gas, coal and uranium) are converted into a measure of energy equivalency, the relevant conversion factors shall be disclosed.

4 The proportion of gross quantities attributable to a company will depend on the specific contractual arrangements governing development and operations, and may be defined by regulation. For corporate reporting, the general principles used to determine net quantities shall be documented.

## F. Reference point

The Reference Point is a defined location within a development at which the reported estimate or measurement is made. The Reference Point may be the sales, transfer or use point from the development or it may be an intermediate stage, in which case the reported quantities account for losses prior to but not subsequent to the delivery point. The Reference Point shall be disclosed in conjunction with the classification. Where the Reference Point is not the point of sale to third parties (or where custody is transferred to the entity's other operations), and such quantities are classified as E1, the information necessary to derive estimated sales shall also be provided.

## G. Classification of projects based on level of maturity

Where it is considered appropriate or helpful to sub-classify projects to reflect different levels of project maturity, based on the current status of the project, the optional Sub-classes shown in Figure 3 of UNFC (see Part I) may be adopted for reporting purposes. Additional guidance on the distinction between the Sub-classes of UNFC is provided in Annex III.

## H. Distinction between E1, E2 and E3

The distinction between quantities that are classified on the Environmental-socio-economic axis as E1, E2 or E3 is based on the phrase "reasonable prospects for environmental-socio-economic viable development in the foreseeable future". The definition of "foreseeable future" can vary depending on the development and hence more details can be found in relevant specifications within UNFC.

The Environmental-socio-economic axis Categories encompass the non-technical issues that directly impact the viability of a project, including product prices, costs, legal/fiscal framework, environmental regulations and known environmental or social impediments, barriers or benefits. Any one of these issues could prevent a new project from proceeding (and hence quantities would be classified as E2 or E3, as appropriate), or it could lead to the suspension or termination of production activities in an existing operation. Where development or operation activities are suspended, but there are "reasonable prospects for environmentally, socially and economically viable production in the foreseeable future", the project shall be reclassified from E1 to E2. Where "reasonable prospects for environmentally, socially and economically viable production in the foreseeable future" cannot be demonstrated, the project shall be reclassified from E1 to E3.

In some cases, the presence of positive social or environmental externalities may be a key driver for starting a project. The classification will record the maturity of the social or environmental aspects and their impact on the project.

## I. Distinction between potentially produced quantities and undeveloped quantities

Quantities of products associated with projects are categorized as F1 to F3 as potentially developable using existing technology or technology currently under development or operation. There may be remaining quantities with no development project. The product quantity associated with these are categorized as F4. These are quantities which, if produced, could be bought, sold or used (i.e. electricity, heat, etc., not wind, solar irradiation, etc.).

## J. Aggregation of quantities

Estimates associated with projects that are classified in different Categories on the Environmental-Socio-Economic or Technical Feasibility axes shall not be aggregated with each other without proper justification and disclosure of the methodology adopted.<sup>5</sup> In all cases, the specific Classes that have been aggregated shall be disclosed in conjunction with the classified quantity (e.g. 111+112+221+222) and a footnote added. The footnote shall state how projects with different E and F categories have been aggregated to account for the

<sup>5</sup> Note that regulatory bodies may explicitly preclude such aggregation in corporate reporting under any circumstances.

likelihood that not all will mature to Viable Projects. It shall also state, if relevant, how quantities with different G categories have been aggregated (arithmetically or stochastically, and if stochastic aggregation is used, how).

Where estimates have been aggregated from multiple projects, consideration should be given to sub-dividing the aggregated totals by product type and by location (e.g. offshore *versus* onshore).

## K. Environmental-socio-economic assumptions

In accordance with the definitions of E1, E2 and E3, environmental-socio-economic assumptions shall be based on current conditions and realistic assumptions of future conditions. Except where constrained by regulation, assumptions of future market conditions should reflect the view of either:

- (a) The organization responsible for the evaluation;
- (b) The view of a competent person<sup>6</sup> or independent evaluator; or,
- (c) An externally published independent view, which is considered to be a reasonable forecast of future conditions.

The basis for the assumptions (as opposed to the actual forecast) shall be disclosed. Where alternative assumptions are used, the alternative estimates shall be identified, and accompanied by an explanation of the assumptions used.

## L. Evaluator qualifications

Evaluators shall possess an appropriate level of expertise and relevant experience in the estimation of the resource project under evaluation.<sup>7</sup>

## M. Units and conversion factors

In order to facilitate global comparability of product estimates, it is recommended that the *Système International d'Unités* (SI units) is used for reporting of estimates. However, it is recognized that there are traditional measurement units that are widely used and accepted for certain products; where such units are used for reporting purposes, conversion factors to SI units shall be provided. Similarly, where quantities are converted from volume or mass to energy equivalents, or other conversions are applied, the conversion factors shall be disclosed.

## N. Documentation

Estimates shall be documented in sufficient detail that would allow an independent evaluator or auditor to clearly understand the basis of the estimate and their classification. Note that this is an obligation for ensuring that appropriate internal documentation is generated and kept, and is not an obligation for external disclosure of such information.

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6 Note that "competent person" may be defined by regulation.

7 In addition, regulatory bodies may explicitly mandate the use of a "competent person", as defined by regulation, with respect to corporate reporting.

# ANNEX I

## GLOSSARY OF TERMS

Term	Definition
<b>Aligned System</b>	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.
<b>Bridging Document</b>	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.
<b>Category</b>	Primary basis for classification using each of the three fundamental Criteria of environmental-socio-economic viability (related Categories being E1, E2, and E3), technical feasibility (related Categories being F1, F2, F3 and F4), and degree of confidence (related Categories being G1, G2, G3 and G4). Definitions of Categories are provided in Annex I of Part I of UNFC.
<b>Class(es)</b>	Primary level of resource classification resulting from the combination of a Category from each of the three Criteria (axes).
<b>Criteria</b>	UNFC utilises three fundamental Criteria for reserve and resource classification: favourability of environmental-socio-economic conditions in establishing the viability of the project (E axis); maturity of technology, studies and commitments necessary to implement the project (F axis); and, degree of confidence in the estimate of quantities of products from the project (G axis). These Criteria are each subdivided into Categories and Sub-categories, which are then combined in the form of Classes or Sub-classes.
<b>Evaluator</b>	Person, or persons, performing estimation and/or classification.
<b>Generic Specifications</b>	Specifications (as documented in this Specifications Document) that apply to the classification of products of a resource project using UNFC.
<b>Identified Project</b>	An identified project is a project associated with a known source.
<b>Known Source</b>	A source that has been demonstrated to exist by direct evidence. More detailed specifications can be found in relevant source-specific Aligned Systems.
<b>Mapping Document</b>	The output of a comparison between another resource classification system and UNFC, or between that system and existing Aligned Systems, which highlights the similarities and differences between the systems. A Mapping Document can provide the basis for assessing the potential for the other system to become an Aligned System through the development of a Bridging Document.
<b>Numerical Code</b>	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).
<b>Potential Source</b>	A source that has not yet been demonstrated to exist by direct evidence, but is assessed as potentially existing based primarily on indirect evidence. More detailed specifications can be found in relevant source-specific Aligned Systems.
<b>Product</b>	Products of the project may be bought, sold or used, including electricity, heat, hydrocarbons, hydrogen, minerals, and water. It is noted that with some projects, such as for renewables, the products (electricity, heat etc.) are different from the sources (wind, solar irradiation etc.). In other projects the products and sources may be similar e.g. in petroleum projects both the sources and products are oil and/or gas, although the fluid state and properties may change from reservoir to surface conditions.

Term	Definition
<b>Project</b>	A Project is a defined development or operation which provides the basis for environmental, social, economic and technical evaluation and decision-making. In the early stages of evaluation, including verification, the Project might be defined only in conceptual terms, whereas more mature Projects will be defined in significant detail. Where no development or operation can currently be defined for all or part of a source, based on existing technology or technology currently under development, all quantities associated with that source (or part thereof) are classified in Category F4. These are quantities which, if produced, could be bought, sold or used.
<b>Sources</b>	Sources, such as bioenergy, geothermal, hydro-marine, solar, wind, injection for storage, hydrocarbons, minerals, nuclear fuels and water, are the feedstock for resource projects from which products can be developed. The sources may be in their natural or secondary (anthropogenic sources, tailings, etc.) state.
<b>Specifications</b>	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 source-specific requirements included in Aligned Systems, as set out in the relevant Bridging Document.
<b>Specifications Document</b>	Specifications for the application of the United Nations Framework Classification for Resources (UNFC).
<b>Sub-categories</b>	Criteria of environmental, social and economic viability, technical feasibility, and degree of confidence.
<b>Sub-classes</b>	Optional subdivision of resource classification based on project maturity principles resulting from the combination of Sub-categories. Project maturity Sub-classes are discussed further in Annex III of this Specifications Document.
<b>Système International d'Unités</b>	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.
<b>UNFC</b>	United Nations Framework Classification for Resources.



# ANNEX II

## GUIDELINES ON THE APPLICATION OF KEY INSTRUCTIONS IN UNFC

<b>Classify (according to UNFC)</b>	To assign estimated quantities to a specific Class (or Sub-class) of UNFC by reference to the definitions of Categories or Sub-categories for each of the three Criteria and taking into account both the Generic Specifications and the source-specific requirements that are included in the Aligned System, as set out in the relevant Bridging Document.
<b>Harmonization of Classification Systems</b>	To identify significant differences between systems, if any, by mapping and then, if necessary, to adjust definitions and/or specifications of one system so that they lead to comparable results. A system that is harmonized with UNFC can become an Aligned System through the development and endorsement (by the Expert Group on Resource Management) of a Bridging Document.
<b>Mapping between Classification Systems</b>	To generate a Mapping Document by comparing the definitions and specifications of each Category/Class of one classification system to the definitions and specification of each of the Categories/Classes in another system in order to identify the similarities and differences between them.
<b>Mapping through an Aligned System</b>	To perform the mapping of a third classification system to UNFC by first mapping it to a system, which is already mapped to, and aligned with, UNFC.
<b>Align Systems</b>	See Harmonization of Classification Systems.
<b>Apply UNFC Directly</b>	To classify quantities without first generating estimates in an Aligned System. This still requires adherence to both the Generic Specifications and the source-specific requirements that are included in the Aligned System, as set out in the relevant Bridging Document.
<b>Use UNFC as a Harmonizing Tool</b>	See Harmonization of Classification Systems.

# ANNEX III

## GUIDELINES ON THE USE OF PROJECT MATURITY TO SUB-CLASSIFY PROJECTS USING UNFC

UNFC provides scope to sub-classify projects by applying the full range of Sub-category definitions.<sup>8</sup> The application of this level of granularity of the system is optional, though it is becoming widely recognised as a powerful tool for portfolio management purposes, both corporately and at a national level. The Sub-classes reflect the concept of classification on the basis of project maturity, which broadly corresponds to the probability that the project will eventually achieve viable operation and product sales or use.

The Category and Sub-category definitions, as well as all generic specifications and relevant resource specifications necessary for the high-level classification into Viable Projects, Potentially Viable Projects and Non-Viable Projects, shall be satisfied before consideration is given to assignment to the appropriate Sub-class.

The project maturity Sub-classes are based on the associated actions (i.e. business decisions, government permits etc.) required to move a project towards viable production. The boundaries between different levels of project maturity are designed to align with internal (corporate) project “decision gates”, thus providing a direct link between decision-making and the capital value process within a company, and the characterization of its portfolio of assets through resource classification.

It is important to note that while the goal of the developer is always to move projects “up the ladder” toward higher levels of maturity, and eventually to viable production, a change in circumstances (e.g. a change to local environmental, social or market considerations, or to the applicable fiscal regime, or disappointing results from further data acquisition) can lead to projects being “downgraded” to a lower Sub-class.

If the Sub-classes in Figure 3 of UNFC (see Part I) are adopted, the following guidelines should be applied.

### (a) Viable Projects

**On Production** is used where the project is actually producing and selling or using one or more products as at the Effective Date of the evaluation. Although implementation of the project may not be 100% complete at that date, the full project shall have all necessary approvals and contracts in place, and capital funds committed.<sup>9</sup> If a part of the project development plan is still subject to separate approval and/or commitment of capital funds such that it is not currently certain to proceed, that part should be classified as a separate project in the appropriate Sub-class.

**Approved for Development** requires that all approvals/contracts are in place, and capital funds have been committed. Construction and installation of project facilities should be underway or due to start imminently. Only a completely unforeseeable change in circumstances that is beyond the control of the developers would be an acceptable reason for failure of the project to be developed within a reasonable time frame.

**Justified for Development** requires that the project has been demonstrated to be technically feasible and environmental-socio-economic viable, and there shall be a reasonable expectation that all necessary approvals/contracts for the project to proceed to development and operation will be forthcoming.

<sup>8</sup> See Figure 3 of UNFC (see Part I).

<sup>9</sup> In some cases, a project may be able to initiate operations and product sales or use even though parts of the approved development plan are not yet complete (e.g. some production wells remain to be drilled and/or connected). However, care is required to distinguish this situation from a phased development where implementation of the later phases is subject to a separate approval process which may even be contingent on the results of the first phase.

## (b) Potentially Viable Projects

**Development Pending** is limited to those projects that are actively subject to project-specific technical activities, such as acquisition of additional data (e.g. appraisal drilling) or the completion of project feasibility studies and associated socio, environmental and economic analyses designed to confirm project viability and/or to determine the optimum development scenario. In addition, it may include projects that have non-technical contingencies, provided these contingencies are currently being actively pursued by the developers and are expected to be resolved positively within a reasonable time frame. Such projects would be expected to have a high probability of achieving viability.

**Development On Hold** is used where a project is considered to have at least a reasonable chance of achieving viability (i.e. there are reasonable prospects for eventual economic production), but where there are currently major non-technical contingencies (e.g. environmental or social issues) that need to be resolved before the project can move towards development.<sup>10</sup> The primary difference between Development Pending and Development On Hold is that in the former case the only significant contingencies are ones that can be, and are being, directly influenced by the developers (e.g. through negotiations), whereas in the latter case the primary contingencies are subject to the decisions of others over which the developers have little or no direct influence and both the outcome and the timing of those decisions is subject to significant uncertainty.

## (c) Non-Viable Projects

**Development Unclassified** is appropriate for projects that are still in the early stages of technical and environmental-socio-economic evaluation (e.g. a recent new discovery), and/or where significant further data acquisition will be required, in order to make a meaningful assessment of the potential for a viable development, i.e. there is currently insufficient basis for concluding that there are reasonable prospects for eventual viable production.

**Development not Viable** is used where a technically feasible project can be identified, but it has been assessed as being of insufficient potential to warrant any further data acquisition activities or any direct efforts to remove contingencies. In such cases, it can be helpful to identify and record these quantities so that the potential for a viable development opportunity will be recognized in the event of a major change in technology or environmental-socio-economic conditions.

## (d) Remaining products not developed from projects

Quantities should only be classified as Remaining products not developed from projects where no technically feasible projects have been identified that could lead to the production of any of these quantities. Some of these quantities may subsequently be produced in the future due to the development of new technology.

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<sup>10</sup> Lack of sufficient demand in an existing and accessible economically viable market could be another reason for a project being classified as Development On Hold, but care is required to distinguish this situation from one where no economically viable market currently exists (Development not Viable).

# United Nations Framework Classification for Resources Update 2019

The United Nations Framework Classification for Resources (UNFC) is a global classification and management system applicable to mineral, petroleum, nuclear fuel, renewable energy and anthropogenic resources, as well as water and injection projects for geological storage. Since the adoption of the Sustainable Development Goals (SDGs), managing energy and raw material resources in a sustainable manner has become paramount to all stakeholders including governments, industry, investors and communities.

This updated version of UNFC is intended to satisfy the requirements of different resource sectors and applications, as well as making it fully aligned to the sustainable resource management called for by the 2030 Agenda for Sustainable Development. The key changes, including the normalization of the text, make UNFC applicable for all resources. This update does not change the classification system and hence does not impact the current users of UNFC. The updated text is intended to make application easier for users of UNFC.

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