



# **Case Studies on adaptation of Ukrainian Mineral Resources Classification to UNFC 2009 (state and prospects)**

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## Case Studies on adaptation of Ukrainian Mineral Resources Classification to UNFC 2009

Starting with 1997 Ukraine applies Mineral Resources Classification on the national level, which was developed following the UNECOSOC Resolution No 227/1997, according to which UNFC 1997 was recommended for practical use by UN member-countries.

The Classification is general: it is adapted to all types of minerals (coal, petroleum, non-metallic raw material, solid minerals and underground waters).

In order to apply the National Mineral Resources Classification of State Subsoil Fund to various mineral deposits, the appropriate Instructions (Guidelines) were issued.

Find below The Classification:

# UKRAINIAN MINERAL RESOURCES CLASSIFICATION

The Category of commercial significance	The Category of technical and-economic knowledge		The Category of geological knowledge	Class code	
<b>1. Balance reserves (1..)</b>	GEE-1 (.1.) <i>On production and Approved for Development</i>		Explored reserves (..1)	<b>111</b> <b>(proved)</b>	<i>Commercial</i>
	GEE-2 (.2.) <i>Substantiated for Development</i>		Prospected reserves (..2)	<b>121</b> <b>(probable)</b>	
				<b>122</b> <b>(probable)</b>	
<b>2. Conditionally balance and outbalance reserves (2..)</b>	<i>Pending Development</i>	GEE-1 (.1.)	Explored reserves (..1)	<b>211</b>	<i>Potentially Commercial</i>
		GEE-2 (.2.)		Prospected reserves (..2)	
<b>3. Economic value is not defined (3..)</b>	<i>Development Unclassified</i>	GEE-3 (.3.)	Explored reserves (..1)	<b>331</b>	<i>Non-Commercial</i>
			Prospected reserves (..2)	<b>332</b>	
	<i>No sub-classes defined</i>		Possible resources (..3)	<b>333</b>	<i>Exploration</i>
			Inferred resources (..4)	<b>334</b>	

## COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION

In Ukraine the case studies on adaptation of National classification to the UNFC-2009 continued during the period of 2012 – 2013 years. In the result of these studies the project of amendments and addenda to the Classification was prepared. The amendments will be entered in accordance with the law.

Mapping of Ukrainian Classification to UNECE 2009 is based on the unity of approaches to the resources/reserves qualification due to the main criteria:

- 1) the degree of commercial significance (economic and social viability) (the E axis);*
- 2) the degree of technical-and-economic assessment (project feasibility) (the F axis);*
- 3) the degree of geological knowledge (the G axis).*

The results of mapping are presented in the following table:

## COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE E AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>E1</b>	<p>Extraction and sale has been confirmed to be economically viable.</p> <p>Extraction and sale is economic on the basis of current market conditions and realistic assumptions of future market conditions.</p>	<p>Reserves that can be cost effectively produced and used at the time of evaluation according to technical and economic calculations.</p>	<b>1.x.x</b>
<b>E1.1</b>	<p>Extraction and sale are economic under current market conditions and realistic assumptions of future market conditions.</p>	<p>Producible reserves. The profitability of production activity of a mining enterprise exceeds the refinancing of the National Bank of Ukraine.</p>	<b>1.1.x.x</b>

# COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE E AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>E1.2</b>	Extraction and sale is not economic on the basis of current market conditions and realistic assumptions of future market conditions, but is made viable through government subsidies and/or other considerations	Effective extraction and use of mineral resources by projected mining enterprise according to SCMR definitions is possible subject to the provision of easy terms, donations or another support.	<b>1.2.x.x</b>
<b>E2</b>	Extraction and sale is expected to become economically viable in the foreseeable future.	Reserves that in the future may become commercial objects (potentially economic).	<b>2.x.x</b>

## COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE E AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>E3</b>	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.	Mineral resources and reserves with non-defined economic value and initial economic-geological evaluation	<b>3.x.x</b>
<b>E3.1</b>	Quantities that are forecast to be extracted, but which will not be available for sale.	Quantities that will be lost or used in the process of extraction and preparation for sales.	<b>3.1.x.x</b>
<b>E3.2</b>	Economic viability of extraction cannot yet be determined due to insufficient information (e.g. during the exploration phase).	Mineral resources and reserves with non-defined economic value and initial economic-geological evaluation.	<b>3.2.x.x</b>

# COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE E AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>E3.3</b>	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.	The amount of mineral raw materials that are evaluated as impossible for mining and processing in the foreseeable future, and which are not included into or excluded from the State Balance Record.	<b>3.3.x.x</b>



# CONCLUSIONS

**1. The definitions of the economic efficiency E axis, which were accepted by UNFC-2009 for main Categories E1, E2 and E3 and Sub-Categories E1.1 and E1.2, may be comparable and have a close meaning with those used in Ukrainian Classification.**

**2. According to the draft Classification, it is foreseen to bring Sub-Categories E3.1 and E3.3 to correspondence with the UNFC-2009.**

## COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE F AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>F1</b>	Feasibility of extraction by a defined development project or mining operation has been confirmed.	Detailed economic-geological assessment of mineral resources industrial development was carried out. Its materials, including feasibility study for constant conditions of mineral raw materials, are approved by SCMR.	<b>x.1.x</b>
<b>F1.1</b>	Extraction is currently taking place.	Reserves involved into the commercial development	<b>x.1.1.x</b>
<b>F1.2</b>	Capital funds have been committed and implementation of the development project or mining operation is underway.	Reserves involved into the pilot commercial development, reserves of construction companies.	<b>x.1.2.x</b>

## COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE F AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>F1.3</b>	Sufficiently detailed studies have been completed to demonstrate the feasibility of extraction by implementing a definite development project or mining operation	Detailed geological exploration works were completed in order to determine the feasibility of definite development project.	<b>x.1.3.x</b>
<b>F2</b>	Feasibility of extraction by a defined development project or mining operation is subject to further evaluation.	The initial economic-geological assessment of commercial value was carried out. TEC materials are approved by SCMR or by the customer of further geological exploration works.	<b>x.2.x</b>
<b>F2.1</b>	Project activities are ongoing to justify development in the foreseeable future.	Preliminary assessment continues to validate the commercial value of the deposit.	<b>x.2.1.x</b>

## COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE F AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>F2.2</b>	Project activities are on hold and/or where justification as a commercial development may be subject to significant delay.	Implementation of the project under stoppage and/or substantiation of commercial development may be subject to significant delay.	<b>x.2.2.x</b>
<b>F2.3</b>	There are no current plans to develop or to acquire additional data at the time due to limited potential.	At the time of assessment there are no current plans to develop or collect additional data due to limited opportunities.	<b>x.2.3.x</b>

# CONCLUSIONS

- 1. According to the F axis, which presents the degree of technical-and-economic feasibility project, the definitions that are used by UNFC 2009 are relatively comparable with those used in the Ukrainian Classification for main Categories: F1, F2 and F3.**
- 2. Sub-Categories F1.1, F1.2, F1.3, F2.1, F2.2, F2.3 and also the F4 Category fall into newly specified ones.**

# COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE G AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>G1</b>	Quantities associated with a known deposit that can be estimated with a high level of confidence. Quantities of fluid mineral resources are estimated by <b>G1</b> Category.	Explored reserves – such mineral resources, quantity, quality, technological properties, mining-geological and other conditions of which are studied with completeness, sufficient for development of projects on extractive objects construction.	<b>x.x.1</b>

# COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE G AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>G2</b>	<p>Quantities associated with a known deposit that can be estimated with a moderate level of confidence.</p> <p>Quantities of fluid mineral resources are estimated by <b>G1+G2</b> Categories.</p>	<p>Prospected reserves – such mineral resources, quantity, quality, technological properties, mining-geological and other conditions of which are studied with completeness, sufficient for definition of deposit's industrial significance.</p>	<b>x.x.2</b>

# COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE G AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>G3</b>	<p>Quantities associated with a known deposit that can be estimated with a low level of confidence. 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+G2+G3.</p>	<p>Possible resources consider the possibility to discover new mineral deposits of definite geological-industrial type, existence of which is substantiated by a positive estimation of mineral occurrences, geophysical and other anomalies, which nature and perceptiveness are proved.</p>	<b>x.x.3</b>



# COMPARISON OF CATEGORIES AND SUB-CATEGORIES DEFINITIONS APPROVED BY UNFC-2009 AS ALSO BY DRAFT UKRAINIAN CLASSIFICATION, THE G AXIS

Categories and Sub-Categories of UNFC-2009	Definitions of UNFC-2009	Definitions of Draft Ukrainian Classification	Code of Categories and Sub-Categories for Draft Ukrainian Classification
<b>G4</b>	<p>Estimated quantities associated with a potential deposit, based primarily on indirect evidence.</p> <p>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.</p>	<p>Inferred resources – the amount of minerals that take into account the potential for the formation of deposits of certain geological and commercial types, based on positive stratigraphic, lithological, tectonic and other preconditions within the prospective areas.</p>	<b>x.x.4</b>

# CONCLUSIONS

**1. Mapping shows that definitions of G1 and G4 coincide in both Classifications.**

**2. Due to the Ukrainian Classification, mineral resource quantity for G2 may be determined as a sum of G1 and G2 Categories; and G3 Category – as a sum of G1+G2+G3, according to the accepted methods of mineral reserves and resources calculation and accounting.**

# DRAFT UKRAINIAN CLASSIFICATION OF MINERAL RESERVES AND RESOURCES

<u>Socio-economic viability (E)</u>	<u>Project feasibility (F)</u>		<u>Geological knowledge (G)</u>	<u>Class code</u>	
<b>1. Balance reserves (1..)</b> <b>E1</b> <b>E1.1; E1.2</b>	<i>Producible and approved for development</i>	<b>EGE -1 (.1.)</b> <b>F1</b> <b>F1.1; F1.2; F1.3</b>	<b>Explored reserves (..1)</b> <b>G1</b>	<b>111</b> <b>(Proved)</b>	<i>Commercial</i>
		<i>Proved for development</i>	<b>EGE -2 (.2.)</b> <b>F2</b> <b>F2.1; F2.2</b>	<b>Explored reserves (..1)</b> <b>G1</b>	
	<b>Prospected reserves (..2)</b> <b>G2</b>			<b>122</b> <b>(Probable)</b>	
<b>2. Conditionally balance and off-balance reserves (2..) E2</b>	<i>Pending development</i>	<b>EGE -1 (.1.)</b> <b>F1 (F1.3)</b>	<b>Explored reserves (..1) G1</b>	<b>211</b>	<i>Potentially Commercial</i>
		<b>EGE -2 (.2.)</b> <b>F2</b>		<b>Prospected reserves (..2)</b>	
				<b>222</b>	

# DRAFT UKRAINIAN CLASSIFICATION OF MINERAL RESERVES AND RESOURCES

<p><b>3. Commercial value is not defined (3.)</b>  <b>E3</b>  <b>E3.1; E3.2</b>  <b>E3 (E3.3)</b></p>	<p><i>Development not clarified</i></p>	<p><b>EGE -3 (.3.)</b></p>	<p>Explored reserves (..1) G1</p>	<p><b>331</b></p>	<p><i>Non-Commercial</i></p>
			<p>Prospected reserves (..2) G2</p>	<p><b>332</b></p>	
			<p>Possible resources (..3) G3</p>	<p><b>333</b></p>	<p><i>Geologically explored</i></p>
			<p>Inferred resources (..4) G4</p>	<p><b>334</b></p>	
		<p><b>EGE -4 (.4.)</b></p>	<p>Explored reserves (..1) G1</p>	<p><b>341</b></p>	<p><i>Residual quantities (additional)</i></p>
			<p>Prospected reserves (..2) G2</p>	<p><b>342</b></p>	
			<p>(..3) G3</p>	<p><b>343</b></p>	
			<p>(..4) G4</p>	<p><b>344</b></p>	

**THANK YOU  
FOR YOUR ATTENTION!**